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EXPLORING A VYGOTSKIAN THEORY OF EDUCATION
AND ITS EVOLUTIONARY FOUNDATIONS

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ABSTRACT. Despite his popularity in educational discourses, Lev S. Vygotsky tends to be read mainly as an educational psychologist or learning theorist. His potential contribution to a theory of education remains largely undiscussed. The Zone of Proximal Development (ZPD) is often misunderstood as a sort of “educational tool,” which severely reduces the richness of the concept emerging from Vygotsky’s works. In this essay, Aline Nardo argues that acknowledging the evolutionary underpinnings in Vygotsky’s thinking would enrich an educational discussion of Vygotsky. This substrate in Vygotsky’s educational works, she argues, has been strikingly underappreciated, and her analysis seeks to address this gap by building upon the analogy between Vygotsky’s Marxist negation of a Darwinian adaptation paradigm and his conceptual differentiation between learning and development in order to draw out the pedagogical dimension of the ZPD. Pedagogical interaction, in an evolutionary reading of Vygotsky, is qualitatively different from peer interactions, as it is connected to *development* rather than learning. This perspective, Nardo concludes, has important implications for the role of the teacher and a definition of “the pedagogical.”

KEY WORDS. Lev S. Vygotsky; Zone of Proximal Development; Darwinism; adaptation; negation

INTRODUCTION

Since the 1960s, Lev S. Vygotsky has gained increasing popularity across educational discourses — in particular, in the context of constructivist pedagogies and teacher education.¹ It seems, however, that within these discourses Vygotsky tends to be read primarily as an educational psychologist or learning theorist, while his contribution to a theory of education remains largely unexplored. In this paper I will argue that the absence of Vygotsky’s ideas from educational theory presents a missed opportunity, leaving unacknowledged his timely commentary on the role of the teacher. Specifically, I propose that a focus on the evolutionary underpinnings in Vygotsky’s thought may enhance our understanding of the educational contribution of his works.

The Zone of Proximal Development (ZPD) is one of the most well-known educational concepts of Vygotsky.² Despite its popularity, it is often used simplistically as “a special kind of educational technique,”³ suggesting that

1. On this point, see Vasily Davydov, “The Influence of L. S. Vygotsky on Education Theory, Research, and Practice,” *Educational Researcher* 24, no. 3 (1995): 12–21; and Wolff-Michael Roth and Alfredo Jor-net, *Understanding Educational Psychology: A Late Vygotskian, Spinozist Approach* (Berlin: Springer, 2017), 1.

2. Alex Kozulin, “Vygotsky’s Theory of Cognitive Development,” *International Encyclopedia of Social and Behavioral Sciences*, vol. 25, ed. J. D. Wright (Oxford: Elsevier, 2015), 322–328; and Seth Chaiklin, “The Zone of Proximal Development in Vygotsky’s Analysis of Learning and Instruction,” in *Vygotsky’s Educational Theory in Cultural Context*, ed. Alex Kozulin, Boris Gindis, Vladimir S. Ageyev, and Suzanne Miller (Cambridge: Cambridge University Press, 2003), 26.

3. Roth and Jornet, *Understanding Educational Psychology*, 149.

meaningful learning processes are externally determinable. Frequently associated with the term “scaffolding” — particularly in the context of constructivist pedagogies — such instrumental readings of Vygotsky’s ZPD are widespread.⁴ From the understanding of Vygotsky developed in this paper, such a conception of the ZPD is problematic. First of all, the idea of the ZPD as a technique eradicates the inherent transformative potential of his concept of education by neglecting Vygotsky’s emphasis on individual and communal agency in development and evolution.⁵ Furthermore — and this is the main point of this paper — an understanding of the ZPD as an “educational technique” reduces the complexity of pedagogical interaction and thereby evokes an idea of teaching as merely technical know-how. Such a concept of teaching does not only neglect the contingency and dialogic nature of the pedagogical relationship, but also feeds into the idea that teachers are replaceable by technologies and intelligent machines. By systematically revisiting the evolutionary underpinnings in Vygotsky’s thinking, I aim to contribute to a re-positioning of Vygotsky’s educational theory and pedagogy and use that perspective to reflect on the role of teachers today.

There prevails a striking underappreciation of the evolutionary underpinnings in Vygotsky’s works with regard to their educational consequences.⁶ While Vygotsky’s integration of Darwinism has been discussed in other disciplines — indeed, at times even with some consideration of educationally relevant concepts such as “development”⁷ — there exists, to my knowledge, no comprehensive analysis of the evolutionary underpinnings in Vygotsky’s educationally relevant works that focuses on the pedagogical dimension of “the artificial development of the child.”⁸ The most in-depth analysis of Vygotsky’s adoption of Darwinism in the context of education can be found in the work of Anna Stetsenko. Stetsenko deconstructs a concept of the ZPD as externally determinable and emphasizes the individual’s agency in her/his own development. While fully agreeing with her emphasis on

4. Peter Smagorinsky, “Is Instructional Scaffolding Actually Vygotskian, and Why Should It Matter to Literacy Teachers?,” *Journal of Adolescent & Adult Literacy* 62, no. 3 (2018): 253–257.

5. Anna Stetsenko, *The Transformative Mind: Expanding Vygotsky’s Approach to Development and Education* (Cambridge: Cambridge University Press, 2016).

6. Ibid.

7. James Wertsch, *Vygotsky and the Social Formation of Mind* (Cambridge, MA: Harvard University Press, 1985), 23, 33; Anna Stetsenko, “Darwin and Vygotsky on Development: An Exegesis on Human Nature,” in *Children, Development, and Education: Cultural, Historical, Anthropological Perspectives*, ed. Michaelis Kontopodis, Christoph Wulf, and Bernd Fichtner (Berlin: Springer, 2011).

8. Lev S. Vygotsky, *The History of the Development of Higher Mental Functions* (1930), ed. Robert Rieber, trans. Marie J. Hall, vol. 4 of *The Collected Works of L. S. Vygotsky* (New York: Plenum, 1987), 110.

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individual agency, I argue that in defining the ZPD as a “collectively created”⁹ path of development, something essential about pedagogical interaction — described by Klaus Prange as *Zeigen* (showing)¹⁰ — might be lost. In Stetsenko’s efforts to emphasize the student’s agency, the qualitative difference of the pedagogical relationship in contrast to collaborative processes among peers is obscured, or at least remains largely undiscussed. In consequence, the role and responsibility of the teacher, as well as the significance of the pedagogical dimension in Vygotsky’s account of individual development and human evolution, fall by the wayside.

In the reading of Vygotsky proposed in this paper, teaching is associated with a particular quality of “learning” — which Vygotsky refers to as “Development”¹¹ — that is different from processes of learning that occur with peers or in interaction with the material world. I argue that Vygotsky’s Marxist negation of a Darwinian adaptation paradigm can enrich our understanding of that qualitative difference in mental development and, in particular, might help us in better understanding the educational dimension of that qualitative change, “the leap” from learning to Development.

This paper is divided into three main sections. First, I introduce Vygotsky’s concept of evolution. Second, I draw out the analogies between his idea of human evolution and individual development. In particular, I focus on the distinction between *learning* as a continuous process, and *Development* as a discontinuous process involving both biological inheritance and its sociocultural transcendence.¹² In section three, I discuss the specific role that Vygotsky assigned to pedagogical interaction within these processes of transcendence and present an in-depth analysis of their rootedness in his evolutionism. In concluding this paper, I discuss the consequences of the proposed evolutionary reading of Vygotsky’s educational works for a new philosophy of teaching and instruction.

VGOTSKY’S CONCEPT OF EVOLUTION

The influence of Darwinism on Vygotsky’s works is less explicit than other intellectual traditions he drew from, such as Hegel’s *Phenomenology of Spirit* or Spinoza’s monist materialism.¹³ Nonetheless, with the anti-essentialist idea of nature and the historical perspective on development that he propagated, Vygotsky “was profoundly indebted to Darwin’s idea of evolution.”¹⁴ In this paper, I focus

9. Stetsenko, *The Transformative Mind*, 326.

10. Klaus Prange, *Pädagogik als Erfahrungsprozess* [Pedagogy as a process of experience] (Stuttgart, Germany: Klett-Cotta, 1987).

11. In this paper, I use “Development” with a capital D when referring to Vygotsky’s particular concept of individual development.

12. Wertsch, *Vygotsky and the Social Formation of Mind*, 19.

13. On these themes, see Manolis Dafermos, *Rethinking Cultural-Historical Theory: A Dialectical Perspective to Vygotsky* (Berlin: Springer, 2018), 75; and Jan Derry, *Vygotsky: Philosophy and Education* (Malden, MA: Wiley Blackwell, 2013), 110.

14. Stetsenko, *The Transformative Mind*, 133.

on Vygotsky's concept of adaptation. I argue that the way he came to integrate — and ultimately negate — a Darwinian idea of adaptation has profound implications for his concept of education, and, in particular, his understanding of the role of the teacher. That is, because in contrast to other relevant thinkers in education who drew from evolutionary theory — such as Dewey¹⁵ — Vygotsky's particular evolutionary perspective is based on the partial *rejection* of the Darwinian principle of adaptation. While Dewey used a Darwinian concept of adaptation to conceptualize *education as growth*¹⁶ — a cumulative adaptive movement transforming individuals and their environments simultaneously — on Vygotsky's view, individual development is characterized by *breaks* and "*leaps*." In Vygotsky's account, human evolution "performed" a "shift away from adaptation."¹⁷ This "shift away" as a distinctive feature of human evolution, I will argue in part two of this paper, is a key component of Vygotsky's concept of pedagogical interaction, where it represents a qualitative shift from learning to Development.

VYGOTSKY'S NEGATION OF THE DARWINIAN ADAPTATION PARADIGM

Vygotsky defines adaptation as "the fundamental and universal law of development and life of organisms."¹⁸ He considered the human mind to be a product of active adaptation "to new or changing conditions in the external environment."¹⁹ Despite Vygotsky's contention that "the biological expediency of mind here serves as the basic explanatory principle,"²⁰ he deemed the framework of Darwinian adaptation insufficient to explain fully the emergence of "higher mental functions"²¹ in human evolution as qualitatively distinct from other forms of animal cognition. "Somewhere, in some specific stage of animal development," he writes,

a *qualitative* change in the development of brain processes took place, which, on the one hand, was prepared by the whole preceding course of development, but, on the other hand, was a *leap* that could not be mechanically reduced to more simple phenomena.²²

15. Aline Nardo, "The Evolutionary Foundations of John Dewey's Concept of Growth and Its Meaning for His Educational Theory," *Zeitschrift für Pädagogik* 64, no. 6 (2018): 852–870.

16. John Dewey, *Democracy and Education* (1916), in vol. 9 of *John Dewey: The Middle Works, 1899–1924*, ed. Jo Ann Boydston (Carbondale: Southern Illinois University Press, 2008), 4–375.

17. Anna Stetsenko, "Personhood: An Activist Project of Historical Becoming through Collaborative Pursuits of Social Transformation," *New Ideas in Psychology* 30, no. 1 (2012): 148.

18. Lev S. Vygotsky, *Problems of the Theory and History of Psychology*, ed. Robert Rieber and Jeffrey Wollcock, trans. René van der Veer, vol. 3 of *The Collected Works of L. S. Vygotsky* (New York: Plenum, 1987), 57.

19. *Ibid.*, 63.

20. *Ibid.*, 153.

21. Lev S. Vygotsky, "Tool and Sign in the Development of the Child" (1930), in *Scientific Legacy*, ed. Robert Rieber, trans. Marie J. Hall, vol. 6 of *The Collected Works of L. S. Vygotsky* (New York: Plenum, 1987), 22.

22. *Ibid.*, 113 (emphasis added).

That “leap” in human cognition, Vygotsky suggested, fundamentally altered the trajectory of human evolution. “In our view,” he writes, “a fundamental difference distinguishes the product of biological evolution (i.e. the natural form of thinking) from the historically emerging forms of human intellect.”²³ After the “leap,” following a Vygotskian perspective, “human nature is seen as superseding these origins and transcending any biological imperatives, allowing for a ‘leap’ into the realm of freedom and self-determination.”²⁴ Rather than being merely adaptive, henceforth, human activity is, to use the words of Stetsenko, “directed at *transforming* the world (and therefore, always purposeful or goal-directed).”²⁵

THE SOCIAL DIMENSION OF THE “LEAP”

To conceptualize the “leap” — from biology to the “new plane”²⁶ of “purposeful and goal-directed transformation of the world” through culture and human-made history — Vygotsky had to partially reject a Darwinian account of evolution.²⁷ Although embracing an understanding of individual development as a fundamentally contingent and environment-dependent process, Vygotsky also wanted to put stronger emphasis on the “dynamic relations between organisms and their world as the driving force of evolutionary change.”²⁸

To define these dynamic relations, Vygotsky drew from historical materialism.²⁹ Historical materialism focuses on the relationship between the material reality and the forces of production — that is, the means and materials accessible to human labor — available to a group of individuals who collaborate in their attempt “to alter their natural environment to suit their particular needs.”³⁰ In a historical materialist view, “the development of history is not determined by the desires or actions of specific human subjects, but instead shaped by the objective facts of material existence.”³¹ The “leap” in human cognition, Vygotsky believed, was directly connected to social interaction and collaboration within these particular material and sociocultural contexts. The mind, “and all individual objectives, that is, processes such as contemplating, goal setting, planning, understanding, feeling,

23. Ibid., 160.

24. Stetsenko, “Darwin and Vygotsky on Development,” 26.

25. Anna Stetsenko, “Teaching-Learning and Development as Activist Projects of Historical Becoming: Expanding Vygotsky’s Approach to Pedagogy,” *Pedagogies: An International Journal* 5, no. 2 (2009): 9 (emphasis added).

26. Vygotsky, “Tool and Sign in the Development of the Child,” 34.

27. Dafermos, *Rethinking Cultural-Historical Theory*, 188.

28. Stetsenko, *The Transformative Mind*, 115.

29. Vygotsky, *Problems of the Theory and History of Psychology*, 338.

30. Ian Buchanan, “Historical Materialism,” in *Dictionary of Critical Theory*, ed. Ian Buchanan (Oxford: Oxford University Press, 2018), n.p.

31. Ibid., n.p.

thinking, and so on," are in his view "instantiations of collaborative practices" *within* specific contexts.³²

VYGOTSKY'S THEORY OF HUMAN COGNITION IN THE LIGHT OF CONTEMPORARY SCIENCE

Vygotsky doubtlessly made a significant and lasting contribution to how we think about human cognition and intelligence.³³ There are, however, several points in Vygotsky's thinking that, from the perspective of contemporary science, raise some questions. The evidence for and against a qualitative or functional differentiation between human and animal cognition, for example, is a matter of ongoing discussion.³⁴ Also Vygotsky's idea of the "leap" is discussed controversially within the neo-Darwinist tradition that propagates a continuous, gradual view of the evolution of biology and culture.³⁵

It lies outside this paper's scope to unpack these questions of consistency of Vygotsky's works with contemporary science. For the educational argument to be developed here, the way Vygotsky came to reject a purely Darwinian account of human cognitive development remains of key significance in spite of scientific discourses that might put the legitimacy of some of his claims up for question.³⁶ Vygotsky's concept of evolution allows us to understand better his idea of education and pedagogical interaction. That is because, as I will argue in this paper, his idea of education as the direction of learning and Development can be understood in analogy to his concept of the "evolutionary leap" induced by collaborative transformative activity. In Vygotsky's understanding of the evolution of the human species, the trajectory changed, superseding an adaptive relationship through collaborative activity. On the level of individual development, analogously, it is a particular kind of social interaction that enables "leaps" from learning to Development. Teaching, in ontogenetic developments, represents the particular category of social interaction that, just like collaboration on the level of phylogenetic evolution, creates a threshold for qualitative change. Before I come to discuss these educational implications of Vygotsky's concept of evolution in depth, in the following section, I discuss the social dimension of the "leap" in human evolution and the category of "labor."

32. Roth and Jornet, *Understanding Educational Psychology*, 159.

33. Olga Vasileva and Natalia Balyasnikova, "(Re)Introducing Vygotsky's Thought: From Historical Overview to Contemporary Psychology," *Frontiers of Psychology* 10, no. 1515 (2019).

34. On the topic of animal versus human cognition, see David Premack, "Human and Animal Cognition: Continuity and Discontinuity," *Proceedings of the National Academy of Sciences of the United States of America* 104, no. 35 (2007): 13861–13867.

35. John Offer, "Social Change and Selectionist Thought: On Spencer, Darwin, and Runciman," *Sociological Review* 58, no. 2 (2010): 305–326.

36. William R. Penuel and James V. Wertsch, "Vygotsky and Identity Formation: A Sociocultural Approach," *Educational Psychologist* 30, no. 2 (1995): 85.

LABOR AND HUMAN'S "SECOND NATURE"

In this part of the paper, I will look at different factors of individual development — biology, social interaction, "auxiliary means," and material as well as sociocultural environments — and discuss some of the implications of these factors for a Vygotskian theory of education.

LABOR AND INDIVIDUAL DEVELOPMENT

Based on the post-Darwinian understanding of evolution as a discontinuous process, Vygotsky studied individual development as a process of qualitative transformations, or "leaps." Vygotsky argued that after the "leap," "man is cognizant of the developing situation,"³⁷ anticipating and intervening with foresight in order to achieve a desired result. That form of relating to the environment is the basis of a "second human nature" that is qualitatively and functionally distinct from all other animals. It is no longer defined by "adaptation but through the social practice of human labor — the collaborative (and therefore sociocultural), transformative practice unfolding and expanding in history."³⁸

The concept of labor is not only significant for Vygotsky's particular understanding of human evolution, but it also informs his concept of individual cognitive development.³⁹ In labor, Vygotsky argued, not only is the sociocultural environment changed collaboratively, but the individual's cognitive functions, abilities, goals, interests, and motivations are also transformed.⁴⁰ Individual development, on his view, "is a collaborative and creative work-in-progress by people acting together in pursuit of their goals while, in the process, always moving beyond the status quo and its existing conditions and limitations."⁴¹

Individual development, in Vygotsky's understanding, is formed through labor, by what is "taken up by people," instead of being "shaped by imperatives of survival and competition for what is typically taken to be limited resources available in the present, by individuals acting in solitude, each on one's own, in maximizing individual gains while adjusting to the status quo."⁴² Vygotsky maintained that through labor — which is enabled by the evolved mental capacity to collaboratively transform environments — the human species "supersedes adaptation and natural selection, that is, dialectically negates, without eliminating them."⁴³

37. Vygotsky, *The History of the Development of Higher Mental Functions*, 208.

38. Stetsenko, "Darwin and Vygotsky on Development," 32.

39. Vygotsky, *The History of the Development of Higher Mental Functions*, 43.

40. Penuel and Wertsch, "Vygotsky and Identity Formation," 85.

41. Stetsenko, *The Transformative Mind*, 35.

42. Ibid., 35, 36.

43. Stetsenko, "Personhood," 149.

These “historically emerging forms of human intellect”⁴⁴ allowed humans to create a new relationship with their environment, and, through the use of tools, to create a “completely new psychological field for action.”⁴⁵ Learning takes up a key role within the individual’s existence and development beyond adaptation.

HISTORICAL EXPERIENCE AND LEARNING

Vygotsky believed that human development essentially has two components. The first is biological, based on what he called “hereditary” or “physically inherited experience.”⁴⁶ Hereditary experience is “formed by the change in their organs under the influence of certain environmental influences”⁴⁷ and in this way submitted to the Darwinian principle of natural selection. Hereditary experiences are transmitted through physical inheritance. The second form of development “consists in the change in the animal’s behavior *without a change in the structure of the body*.”⁴⁸ It is non-hereditary, “historical experience”⁴⁹ that allows the individual to overturn their hereditary experience, to negate it in relation to the sociocultural reality they inhabit.

Inherent to the concept of historical experience is Vygotsky’s idea of learning and — as Vygotsky believed — the unique human possibility to create a qualitatively and functionally different relationship to the environment. While Vygotsky acknowledged that animals are also able to have historical experiences and, thus, learn in relation to their particular environment, he deemed other animals’ ability to learn and use tools to be much more rudimentary than the human capacity to learn through the creation and use of “auxiliary means” in labor.⁵⁰ For humans, new modes and objectives of activity become possible that lie outside of a reactive/adaptive relationship to the environment.

Educational practices that aim to facilitate and direct historical experiences and collaborative activities are a key component of Vygotsky’s idea of non-hereditary adaptation. Before unpacking the educational dimension of Vygotsky’s concept of learning, it is important to look at the social dimension of learning in more depth in order to understand the analogy between Vygotsky’s concept of evolutionary and developmental “leaps.”

44. Vygotsky, *Thinking and Speech*, in *Problems of General Psychology*, ed. Robert Rieber, trans. Norris Minick, vol. 1 of *The Collected Works of L. S. Vygotsky* (New York: Plenum, 1987), 160.

45. Vygotsky, “Tool and Sign in the Development of the Child,” 35.

46. Alex Kozulin, “Psychological Tools and Mediated Learning,” in *Vygotsky’s Educational Theory in Cultural Context*, ed. Kozulin, Gindis, Ageyev, and Miller, 58, 68.

47. *Ibid.*, 57.

48. *Ibid.* (emphasis added). On the current scientific discourse on neuroplasticity and its bearings on education, see, for example, Antonio M. Battro, Kurt W. Fischer, and Pierre J. Léna, eds., *The Educated Brain: Essays in Neuroeducation* (Cambridge: Cambridge University Press, 2009).

49. Kozulin, “Psychological Tools and Mediated Learning,” 58.

50. Lev S. Vygotsky, *Child Psychology*, ed. Robert Rieber, trans. Marie J. Hall, vol. 5 of *The Collected Works of L. S. Vygotsky* (New York: Plenum, 1987), 56.

SOCIOGENESIS AND "AUXILIARY MEANS"

Vygotsky thought of the evolution of the human species as a discontinuous process marked by a major "leap" from active adaption to environmental pressures to goal-directed transformation of sociocultural realities. This "leap" was granted by certain cognitive developments that allowed humans to interact in more complex symbolic ways and, thus, to collaborate in processes of labor.

Analogously to the "leap" in the evolution of the species through the emergence of new forms of collaboration, Vygotsky thought of individual development as fundamentally social. Individual development, on his view, is a process of sociogenesis, which, following the definition of Wolff-Michael Roth and Alfredo Jorner, means that "higher psychological functions originate *as*, not merely *in* social relations, thereby generating both social facts and social persons."⁵¹ Individuals participate in the transformation of the sociocultural reality and are formed within that process. Therein, individual consciousness develops in a process of "thinking-for-doing"⁵² in a particular context. In Vygotsky's own words, "the mental nature of man represents the totality of social relations internalized and made into functions of the individual and forms of his structure."⁵³

In Vygotsky, the negation of hereditary experiences — meaning their transcendence, rather than replacement — takes place through the collective invention, elaboration, and ultimate integration of "auxiliary means" into the mental activity of the individual. Broadly speaking, auxiliary means are tools (such as signs, practices, and language) that, in the process of integration, transform into psychological capacities or habits.⁵⁴ Tools receive their meaning as tools in social interaction (*intermental*) and are later transformed into psychological tools (*intramental*) that allow for the internal direction of activity. Internalized tools, thus, mediate the relationship between the individual and her/his surroundings:

In the instrumental act a new middle term is inserted between the object and the mental operation directed at it: the psychological tool, which becomes the structural center of focus, i.e., the aspect that functionally determines all the processes that form the instrumental act. Any behavioral act then becomes an intellectual operation.⁵⁵

As human cognition and its ability for transformative collaborative activity emerge from social relations, language is a key component of Vygotsky's understanding of individual development. Higher mental functions first exist as communication, as "means of association."⁵⁶ Through communicative speech interaction becomes active transformative practice. Language combines the communicative,

51. Roth and Jorner, *Understanding Educational Psychology*, viii.

52. *Ibid.*, 18.

53. Vygotsky, *The History of the Development of Higher Mental Functions*, 106.

54. Dafermos, *Rethinking Cultural-Historical Theory*, 140.

55. Vygotsky, *Problems of the Theory and History of Psychology*, 87.

56. Vygotsky, *Child Psychology*, 169.

interactive function with the function of meaning-making. Through language, individual experience is shared and thus reveals its meaning "in generalization" in the process of communication and association with others' experiences. The process of generalization causes thought to be "restructured as it is transformed into speech."⁵⁷ Thinking, thus, is inherently social as it is formed in the context of communicative purposes and language: "Thinking is for acting and speaking and therefore marked by needs and affect."⁵⁸ In its integrated form, speech becomes thinking, "it is converted from the reflecting accompanying function into a planning function, shifting to the beginning of the process, transferring from one operation to another."⁵⁹ Thought, Vygotsky argues, "is not expressed, but completed in the word."⁶⁰ Language, thus, marks the "transition from direct, innate, natural forms and methods of behavior to mediated, artificial mental functions that develop in the process of cultural development."⁶¹

ENVIRONMENT AND SOCIOCULTURAL REALITY

Vygotsky's replacement of the adaptation paradigm is connected to his ideas of integration and mediation: humans are no longer forced to adapt to the environment, or pushed to direct their activities at adapting the environment to them based on external pressures. In the light of Vygotsky's expansion of Darwinian adaptation, a few more words have to be said about his notion of "environment." That is because his understanding of labor as a collaborative activity transforming environmental conditions has important repercussions for how he thought of "environment" and, in consequence, how we can think of "educational environments" in a Vygotskian perspective.

Instead of adapting to external environments and their pressures, says Vygotsky, humans integrate the world into their activity, making it a constitutive part of their nature. In this process of integration, "the natural process undergoes a profound reconstruction, being converted into a circuitous, mediated act,"⁶² while the tools and cultural practices themselves are also changed. As part of this process, according to Vygotsky, cultural practices and other tools "ceas[e] to be external" as they are "reorganized into most complex internal psychological systems."⁶³ The world and the individual move closer together, in the sense that the former becomes increasingly a constitutive part of the individual's activity; all that exists in the sociocultural surroundings of the individual — be it material, or not — is integrated into the individual's mental operations. I use the term "sociocultural" to

57. Vygotsky, *Thinking and Speech*, 251.

58. Roth and Jornet, *Understanding Educational Psychology*, 6.

59. Vygotsky, *Child Psychology*, 114.

60. Vygotsky, *Thinking and Speech*, 296.

61. Vygotsky, *Child Psychology*, 168.

62. Vygotsky, "Tool and Sign in the Development of the Child," 55.

63. Ibid.

describe the “lifeworld” of the individual because in Vygotsky “culture” and “the social” can be used virtually interchangeably as, for Vygotsky, “everything cultural is social.”⁶⁴ Tools, therein, are understood to be changing in accordance with, and as an inducing entity of, cultural development in society. Tools are changeable in essence; they are ontologically “in-progress” and know no static existence.⁶⁵ According to this view, tools — both material and psychological — do not have an existence outside of social practices, which breaks up the internal/external dichotomy.

A Vygotskian understanding of environment as sociocultural reality has important implications for the concept of an “educational environment.” The material environment, in Vygotsky’s view, provides the conditions for collaborative activities of students, but cannot replace said activity. Only in collaboration do the artifacts that create the “educational environment” receive their meaning and purpose, as tools. This requires an openness that, in the context of educational technologies and arrangements that “scaffold” the learning process to a predefined outcome, is not easily achieved. So-called “adaptive learning systems” use artificial intelligence to tailor learning environments to individuals in order to ensure optimal “efficiency” in reaching predefined learning outcomes. These “hard and soft technologies that adjust content presented to the student using methodologies such as cognitive modelling and/or sensory input”⁶⁶ are difficult to reconcile with the idea of a transformative effort of the individual in collaboration with others.

FROM A RELATIONAL TO A TRANSFORMATIVE ONTOLOGY

The created reality, following Vygotsky’s thought, is not a place or external environment, but rather “a dynamic field or arena of collective practice” where “social practices and their products are not reified at any analytical step in their descriptions.”⁶⁷ This means that in Vygotsky’s argumentation, in which the *modus operandi* of adaptation is superseded in human existence, “the social” is never turned into an environment with external demands. Thus, following the argumentation of Stetsenko, Vygotsky transcends the relational ontological perspective of his predecessors, introducing a new *transformative ontology*.⁶⁸ Reality, in a Vygotskian perspective, only exists *in* labor, and “being” in that reality only exists *as* labor.⁶⁹ The distinction between the individual and the world as an external is dissolved; Vygotsky “moves beyond the relational worldview, in considering human development specifically in the context of social and

64. Vygotsky, *The History of the Development of Higher Mental Functions*, 106.

65. Simon Marginson and Thi Kim Anh Dang, “Vygotsky’s Sociocultural Theory in the Context of Globalization,” *Asia Pacific Journal of Education* 37, no. 1 (2017): 119.

66. Amy Adcock and Richard Van Eck, “Adaptive Game-Based Learning,” in *Encyclopedia of the Sciences of Learning*, ed. Norbert M. Seel (Boston: Springer, 2012), 106–110.

67. Stetsenko, *The Transformative Mind*, 192, 193.

68. *Ibid.*, 160.

69. Stetsenko, “Teaching-Learning and Development as Activist Projects of Historical Becoming,” 9.

historically evolving reality and, in a related move, considering history specifically in the context of human social practices."⁷⁰ Therein, "both culture and nature are understood as an inherent dimension of human collaborative practices rather than as outside sources of influence."⁷¹

With his transformative ontology, Vygotsky moves beyond the "structure–agency dualism"⁷² inherent in relational ontologies. In collaborative labor, the individual is not adapting to external surroundings in collaboration with others, but is collaboratively shaping the environment. The relationship is not reactive, but purposeful. In this collaborative activity, the individual negates her/his hereditary experience and is "artificially formed." This artificial formation is what Vygotsky understands education to be. The human animal, figuratively speaking, is "artificially" reformed in the process of education and develops a "second nature" based on the sociocultural reality of the collaborative activity she/he participates in. The individual *is* and *becomes* in collaborative labor by integrating tools and, therein, negating innate tendencies and endowments. Significantly, negating does not mean eliminating, but superseding.⁷³ The transpiring notion of human nature derived from the individual–environment unit, as well as the inherent struggle at the heart of this unit (involving negation and reformation), is a core foundation of Vygotsky's educational theory.

A VYGOTSKIAN CONCEPT OF EDUCATION

In the first and second parts of this paper I introduced Vygotsky's concept of human evolution and outlined how he applied the idea of an "evolutionary leap" to his theory of individual learning and Development. In Vygotsky's view, to summarize, while other animals maintain a reactive, adaptive relationship with their surroundings, humans purposefully create their surrounding according not to natural necessity, but within purposeful social practice. The emergent mental abilities that allow the "leap" into collaborative history-making are different from "the direct structure of elementary mental processes"⁷⁴ in that they are integrated with tools. This difference between humans and other animals, it is important to note, Vygotsky did not think of as a mere quantitative elaboration of the former's cognitive abilities. Instead, Vygotsky emphasizes,

The history of development of each of the higher mental functions is not the direct continuation and further improvement of the corresponding elementary functions, but undergoes a *radical change of direction in development* and a subsequent movement of the process to a *completely different plane*.⁷⁵

70. Stetsenko, *The Transformative Mind*, 161.

71. *Ibid.*, 35.

72. Dafermos, *Rethinking Cultural-Historical Theory*, 185.

73. Stetsenko, "Personhood", 149.

74. Vygotsky, *The History of the Development of Higher Mental Functions*, 37.

75. Vygotsky, "Tool and Sign in the Development of the Child," 42 (emphasis added).

Above, I proposed that Vygotsky connected his idea of phylogenetic evolution — and its transcendence in labor — to his concept of education as “the artificial development of the child.”⁷⁶ Analogous to the human species taking a “leap” onto a “new plane,” the individual, through her/his lifetime, can “perform” developmental “leaps” onto different planes of relating to and acting in her/his sociocultural reality.

Individual development, in Vygotsky’s view, is the process in which “the child arms and re-arms himself with widely varying tools.”⁷⁷ “Leaps” in individual development occur in negation of hereditary experience, in their transcendence through the integration of tools in mental processes and actions. Education as the direction of that process takes a key role within Vygotsky’s evolutionary account of individual development. Education is the direction of these “leaps”; education, Vygotsky writes,

is the artificial mastery of natural processes of development. Analogously to the dialectic relationship between evolution and history in phylogeny, in the life of each individual, the innate hereditary experience is transformed in an ongoing process marked by *negation*, leading to the emergence of higher psychological functions and conceptual thinking. Education not only influences certain processes of development but restructures all functions of behavior in a most essential manner.⁷⁸

Despite the important function of education as a practice aimed at providing collaborative opportunities and experiences in Vygotsky’s account of individual learning and development, the nature of the pedagogical relationship appears to fall to the wayside in interpretations of Vygotsky. The evolutionary framework, I argue, is able to shed some light on different qualities of learning in relation to educational practice.

DEVELOPMENT VERSUS LEARNING

It has been established above that Vygotsky thought of individual development — analogously to his concept of human evolution — as a discontinuous process in which processes of learning are broken up by “leaps.” To clarify how these “leaps” are different from learning, and what the role of educational practices might be, I begin with the crucial difference that Vygotsky makes between *learning* and *Development*.

Vygotsky criticized that, among his contemporaries, “evolution as development by gradual and slow accumulation of separate changes continues to be regarded as the only form of child development.”⁷⁹ According to Vygotsky, the concept of development was confounded in psychology due to a “cryptic evolutionism” dominating a child psychology paradigm in which “evolution and

76. Vygotsky, *The History of the Development of Higher Mental Functions*, 110.

77. Vygotsky, *Problems of the Theory and History of Psychology*, 88.

78. Ibid. (emphasis added).

79. Vygotsky, *The History of the Development of Higher Mental Functions*, 99.

revolution seem incompatible."⁸⁰ In his own concept of evolution, Vygotsky merged evolution and revolution in the "socio-biological formation of the child personality."⁸¹ Evolution, therein, means the mixture between structural maturation, that is, physical processes of growth that enable certain developmental processes to emerge, and processes of learning that give rise to developmental "leaps."⁸² The ontogenetic manifestations of these "leaps" are the result of a process of sociogenesis.⁸³

Consequently, in Vygotsky, there exists a difference between "*development*, a qualitative change," and the processes of *learning* that it arises from, which are in themselves "a cumulative change."⁸⁴ These qualitative changes, or *Developments*, lead to a fundamental change in the "metabolism" of the individual-world unit. Vygotsky describes this metabolic change as

[t]he new structure of consciousness acquired at a given age [which] inevitably signifies a new character of perceptions of external reality and activity in it, a new character of the child's perceiving his own mental life and the internal activity of his mental functions.⁸⁵

Development, on his view, is the result of "drama," of "living performance."⁸⁶ Rather than being a gradual, cumulative, and fluid maturation, Development occurs at certain instances in the individual's sociogenetic development and the social context of its participation.⁸⁷ In Development, "not only the use of tools is developing, but also a system of movement and perception, the brain and the hands, the whole organism of the child."⁸⁸

As noted, Vygotsky contended that the artificial or educational formation of the individual is the result of the pronunciation, manifestation, and negation of innate hereditary tendencies through processes of learning and Development. This dialectic formation is inherently social, Vygotsky emphasizes: "The path from the thing to the child and from the child to the thing lies in *another person*. The transition from the biological to the social path of development is the central link in the process of development, a cardinal turning point in the history of the child's behavior."⁸⁹ Learning, I argue, can be understood as the precursor for

80. Ibid.

81. Ibid., 20.

82. Stetsenko, *The Transformative Mind*, 25.

83. Michael Glassman, "Dewey and Vygotsky: Society, Experiences, and Inquiry in Educational Practice," *Educational Researcher* 30, no. 4 (2011): 4.

84. Roth and Jornet, *Understanding Educational Psychology*, 28 (emphasis added).

85. Vygotsky, *Child Psychology*, 199.

86. Stetsenko, "Darwin and Vygotsky on Development," 32.

87. Dafermos, *Rethinking Cultural-Historical Theory*, 175.

88. Vygotsky, *The History of the Development of Higher Mental Functions*, 21.

89. Ibid., 20 (emphasis added).

the quantitative transformation of the individual's mental activity in relation to collaborative purposes that is Development. What transforms processes of learning into Development, we gather from Vygotsky's quote above, is "another person." It is not *any* other person, however. Rather, as I will argue in the following section, in Vygotsky, Development relies on pedagogical interaction — it relies on a teacher.

THE ROLE OF "THE PEDAGOGICAL" IN THE ZONE OF PROXIMAL DEVELOPMENT

With the idea of the ZPD, Vygotsky sought to translate his notion of sociogenesis into an educational concept. Vygotsky defined the ZPD as the

distance between the level of his [the child's, AN] actual development, determined with the help of independently solved tasks, and the level of possible development, defined with the help of tasks solved by the child *under the guidance of adults or in cooperation with more intelligent peers*.⁹⁰

In the ZPD, learning understood as the quantitative accumulation of historical experience is transformed into a qualitative "leap": "the special social situation that has a crisis-like qualitative change as an outcome is designated in Vygotskian literature as the zone of proximal development."⁹¹ The ZPD is always contextualized in a particular sociocultural reality. The mind, in that view, "cannot be conceived as an attribute of an isolated individual," but must instead be understood as the result of thresholds for Development occasioned by learning processes "created by social activity."⁹²

In the ZPD, "another person" presents the individual with ideas and concepts outside of her/his knowledge that are related to her/his previous experience (hereditary and historical).⁹³ Prior to this supplementation of previous experience in interaction, the child forms and reforms unordered "heaps of objects" based on experience into complexes informed by "concrete-empirical thinking."⁹⁴ With increasing experience, these complexes are connected with other complexes, forming so-called "pseudo-concepts," and these pseudo-concepts, in turn, create the basis for the ZPD in which they are contrasted with scientific, or "true concepts."⁹⁵ With the developmental "leaps" from everyday to scientific concepts, the child gains increasing voluntary control over the "metabolism" defining the individual-world unit. They are the foundation of developments that allow the student "to act in the world in a new way."⁹⁶

90. Vygotsky, *Child Psychology*, 204 (emphasis added).

91. Roth and Jornet, *Understanding Educational Psychology*, 148.

92. Derry, *Vygotsky: Philosophy and Education*, 15, 44.

93. Roth and Jornet, *Understanding Educational Psychology*, 149.

94. Vygotsky, *Thinking and Speech*, 134, 137.

95. *Ibid.*, 167.

96. Derry, *Vygotsky: Philosophy and Education*, 76.

While the social dimension of the ZPD is easily understood, its *pedagogical* dimension requires further attention.⁹⁷ In Vygotsky, as noted in the previous section, instruction by “another person” has “productive and unique consequences for development.”⁹⁸ I argue that, even though Vygotsky points out that, in principle, “more intelligent peers” are able to complement everyday concepts with scientific concepts, and thereby productively “step into” their peer’s ZPD, there is a specific *pedagogical quality* to interaction and instruction in the ZPD that cannot be afforded by peers. With this argumentation I seek to bring out some aspects of the timely commentary that a Vygotskian perspective makes for a theory of education and teaching.

I argue that there are at least three factors that fundamentally distinguish the teacher from the “more mature peer” in the ZPD. First, there is the need for *pedagogical expertise* in instruction that cannot be expected from a peer. It is the grounding premise of the ZPD that teaching does not focus on what the child can already do by him- or herself, but instead ties on to what the child can *almost* do or is able to achieve with the help of others.⁹⁹ Therefore, “determining the actual level of development is the most essential and indispensable task in resolving every practical problem of teaching and educating.”¹⁰⁰ Even though peers could technically function as cooperative partners within the ZPD, the teacher’s pedagogical expertise is a key element that distinguishes the teacher from the peer.

Gert Biesta says “that to *learn* from someone is a radically different experience from the experience of being *taught* by someone.”¹⁰¹ In Vygotsky, that difference between learning occurring in collaboration with peers, and learning occurring by being “taught” or instructed, is captured in the concept of *obuchenie*, or “instruction-learning.”¹⁰² *Obuchenie* describes a particular quality of learning that can only be attained through instruction. In the ZPD, a space to be “shown” the scientific “true concepts” is created, a space to be instructed, enabling a qualitative “leap” in the child’s development. Without instruction, the child’s concepts remain everyday concepts based on direct experience.¹⁰³ These concepts are inferior to scientific concepts in that they do not allow for the developmental “leap” of the individual into a transformation- and collaboration-focused relation to her/his

97. Aline Nardo and Dragan Trninic, “Bridging the Theory and Empiric of Learning from Failure,” *Philosophy of Education* 76, no. 2 (2020): 179f.

98. Ibid., 71; and Stetsenko, “Teaching-Learning and Development as Activist Projects of Historical Becoming,” 9.

99. Vygotsky, “Tool and Sign in the Development of the Child,” 198.

100. Ibid., 200.

101. Gert Biesta, “Receiving the Gift of Teaching: From ‘Learning From’ to ‘Being Taught By,’” in *Studies of Philosophy of Education* 32 (2013): 457 (emphasis added).

102. Dafermos, *Rethinking Cultural-Historical Theory*, 165.

103. Derry, *Vygotsky: Philosophy and Education*, 71.

sociocultural surroundings.¹⁰⁴ In the “leap,” the everyday concepts are negated through the integration of their more abstract scientific “equivalent,” introducing the individual to a qualitatively new way of relating to the environment.¹⁰⁵

The ZPD, to use the words of Jan Derry, “involves the ‘relocation’ of ideas”¹⁰⁶ through instruction, rather than their *creation*. Individual development, as it has been discussed at length in the previous part of this paper, is embedded within the sociocultural reality and the previous hereditary and historical experience of the individual. If we accept this, the ZPD cannot be viewed as an educational “technique” or “method” that is able to *determine* developmental trajectories externally. Instead, the ZPD has to be understood as a *zone of potential* that emerges dialogically between the individual’s current state (consisting of both hereditary and historical experience), the sociocultural reality, and the teacher’s recognition of the potential for Development. On this view, teacher-centered instruction and child-centered learning, top-down and bottom-up processes, merge. The ZPD, rather than being an artificial construction of the teacher, is the relational result of the struggles arising from the individual–world unit.¹⁰⁷ Intentional instruction — that is, instruction planned with care and foresight both in terms of the developmental potential and culture — moves ahead of the student’s development, and “when it does, it impels or wakens a whole series of functions that are in a stage of maturation lying in the zone of proximal development.”¹⁰⁸ To recognize the ZPD and to understand how to instruct students accordingly requires a high level of pedagogical expertise that goes beyond technical know-how and one-size-fits-all tools and methods for teaching.

Second, besides pedagogical expertise, instruction in the ZPD requires an advanced *familiarity with artifacts*. A further developed peer might be able to help with the supplementation of everyday concepts with scientific concepts, but lacks the breadth of cultural experience of an adult required to teach tools, not static artifacts. If we accept that, in a Vygotskian perspective, teaching means collaborative tool-mediation, rather than the teaching of symbols, systems, and artifacts predefined in meaning, then the peer — even if she or he is more mature — cannot reliably be expected to take the role as the instructor in the ZPD.¹⁰⁹ Development — that is, the negation of previous ways of interacting with the world and the formation of a qualitatively different relationship between the individual and her/his surroundings — occurs if a symbol or tool is integrated

104. Vygotsky, *Thinking and Speech*, 169.

105. *Ibid.*, 217.

106. Derry, *Vygotsky: Philosophy and Education*, 96.

107. Roth and Jornet, *Understanding Educational Psychology*, 247.

108. Vygotsky, “Tool and Sign in the Development of the Child,” 212.

109. Harry Daniels, “Vygotsky and Dialogic Pedagogy,” in *Dialogic Pedagogy: The Importance of Dialogue in Teaching and Learning*, ed. David Skidmore and Kyoko Murakami (Tonawanda, NY: Multilingual Matters, 2016), 63.

"as a generalized instrument, that is, a psychological tool capable of organizing individual cognitive and learning functions in different contexts and in application to different tasks."¹¹⁰ Without the required openness to co-create this meaning of the tool, and the "cultural maturity" that allows instruction that is *not* the transmission of predefined meaning, the ZPD as I understand it cannot come into full fruition. "That is why the inability to teach psychological tools in a transcendent manner inevitably leads to failure in their appropriation by students," Alex Kozulin argues.¹¹¹ This has profound implications for the role of the teacher and throws up the question of the extent to which the currently prevalent output orientation in educational practice and policy can allow for meaningful teaching practices in the sense of Vygotsky. It also puts further emphasis on the difference between the peer and the teacher, or so-called artificially intelligent "adaptive learning systems" and the teacher.

This leads me over to discuss the third factor that distinguishes the teacher from the more mature peer in the ZPD: *responsibility*. Not only can the peer not be expected to have the pedagogical and cultural expertise required to recognize and "furnish" the ZPD, but the peer also cannot be expected to take responsibility for that process. The teacher is, at least theoretically, able *and* expected to "show something new to the student" in a capacity that cannot be expected from the more intelligent peer; the peer cannot be made responsible for showing something with pedagogical intentionality. The pedagogical relationship, following Klaus Prange, is defined by *Zeigen* ("showing").¹¹² Collaboration among peers also involves moments of *Zeigen*, but these differ from the pedagogical "showing" in that they are not necessarily intentional.¹¹³ In summary, a further developed peer cannot be expected to recognize emerging ZPDs and exploit them purposefully and responsibly.¹¹⁴

Pedagogical relationships — that is, relationships between teacher and student — I conclude, have a unique role within the Development of the individual.¹¹⁵ The idea that the ZPD's social dimension can be replaced by an intelligent machine that provides "the proper cognitive support" for the development of "an effective schema,"¹¹⁶ in light of the reading developed in this paper, represents a questionable reduction of the ZPD as a dialogic space. *Zeigen* — or, as Biesta describes it, "showing something radically new" — is more than mere adequate preparation

110. Kozulin, "Psychological Tools and Mediated Learning," 26.

111. Ibid.

112. Prange, *Pädagogik als Erfahrungsprozess*.

113. Wolfgang Brezinka, *Grundbegriffe der Erziehungswissenschaft. Analyse, Kritik, Vorschläge* [Basic concepts of educational science: Analysis, criticism, suggestions] (Munich, Germany: Reinhardt, 1990).

114. Chaiklin, "The Zone of Proximal Development in Vygotsky's Analysis of Learning and Instruction," 43.

115. Derry, *Vygotsky: Philosophy and Education*, 15.

116. Adcock and Van Eck, "Adaptive Game-Based Learning," 108.

of content in order to reach certain predefined outputs. It requires *pedagogical expertise, cultural maturity, and responsibility* that cannot be expected from an artificial agent.

Pedagogical interaction is also of unique importance in how Vygotsky thought of the evolution of the human species. "The pedagogical problem," Vygotsky writes, "stands at the very center of the new viewpoint on the mind of man."¹¹⁷ The drawn analogy between the evolutionary "leaps" of the species through labor, and the developmental "leaps" through pedagogical interaction in the individual's lifetime, is also effective the other way around: *Because* humans are able to be taught and become increasingly self-determined through *Developments*, the human evolutionary trajectory is increasingly detached from adaptive pressures.

In the light of current ecological developments, this view seems only partially convincing. The current climate crisis, for example, makes it alarmingly apparent that the hope that the intensely technological human reality of today makes us immune against environmental pressures is, at best, utopian and, at worst, disastrous. The realization of our dependence on Nature and our need to adapt our own objectives to it seems increasingly pressing. While it is outside the scope of this paper to expand on this fully, I argue that Vygotskian sociogenesis might actually provide a fruitful framework to think about education, collaboration and labor in connection to these ecological crises. Sociogenesis is not purely cultural. It is connected not only in hereditary experience, but also rooted in ecological developments. Objectives for interaction and collaboration, in a Vygotskian perspective, are necessarily embedded in current realities and individual development, as the mental integration of these collaborative practices, is deeply connected to those realities of which the current ecological crisis undoubtedly is an inescapable part.

CONCLUSION

With this paper, I seek to enrich the discussion of Vygotsky's contribution to a theory of education. I have argued that the evolutionary focus is able to shed new light on the significance of educational practices in Vygotsky's works, and, in turn, contribute to a widened perspective on some of his most central educational concepts, such as the ZPD. The evolutionary focus explored in this analysis, I argue, stands in support of the significance and responsibility of the teacher. I conclude with a summary of key points and a discussion of the implications of Vygotsky's Marxist–Darwinian evolutionism for educational theory.

Vygotsky believed that after a "leap," the human species was able to alter its relationship to the world. Instead of merely reacting to external pressures, at some point in evolution, humankind developed the cognitive capacities to integrate tools into mental activity in order to purposefully transform environments. Henceforth, "higher mental functions" allowed humans to purposefully transform environments through the collaborative use of tools. "Owing to the features of his adaptation (use of tools, work activity), the development of artificial organs

117. Vygotsky, *Problems of the Theory and History of Psychology*, 148.

replaced the development of natural organs."¹¹⁸ In its capacity to be formed not merely in relation to the environment, but within the practice of purposefully transforming the environment, the human species is unique in the animal kingdom.

Vygotsky's idea of the evolutionary "leap" from adaptation to labor manifests on the level of individual development as "leaps" from cumulative processes of learning to Development that enables qualitatively new ways of being and acting in the world. Developments are marked by the negation of hereditary experiences and their increasing replacement by historical experience. Education, in Vygotsky, is the direction of that process of negation. I have argued that pedagogical interaction is key for understanding the process of negation and the difference between learning and Development. The ZPD, therein, emerges as a dialogical "zone of potential," rather than a mere instructional tool that allows one to externally determine processes of learning (for example, as in artificially intelligent adaptive learning systems).

At the same time, this paper wants to problematize a definition of the ZPD as an entirely symmetric collaborative moment that discards a pedagogical — and therefore a somewhat asymmetrical — dimension. Stetsenko, for example, argues that "teaching-learning is the path for students and teachers to *together* explore, enact, and realize the process of co-creating their unique identities through co-creating and co-inventing something novel in our shared world."¹¹⁹ It is not my intention to criticize Stetsenko, but to examine the pedagogical nature of individual development and learning. If pedagogical relationships are understood as largely symmetrical, they become indistinguishable from other social relations. On the account presented in this paper, however, the intentional pedagogical act of *Zeigen* is essential to the ZPD. Yet, *Zeigen* implies an asymmetry of pedagogical expertise, familiarity with cultural artifacts, and pedagogical responsibility.

The pedagogical relationship is asymmetrical in that the student is not responsible for "showing something new" to the teacher (even though she or he doubtlessly will do so all the time, as every teacher will know). Vice versa, however, this responsibility is constitutive of the relationship. Without the pedagogical expertise of the teacher that allows her/him to *recognize* developmental thresholds, and her/his willingness to take the *responsibility* of elevating those thresholds by "showing something new" — something which is a matter of the teacher's judgment — the ZPD is reduced to the tailoring of teaching to the imminent needs of the student. Such a conception of education leaves little space for transcendence and transformation.

A Vygotskian theory of education, I contend, involves "showing something new" to the younger generation, according to the developmental potential they have and given sociocultural and material conditions. Development — that is, the

118. Vygotsky, "Tool and Sign in the Development of the Child," 16 (emphasis added).

119. Stetsenko, *The Transformative Mind*, 325.

qualitative superseding of previous ways of thinking, acting, and knowing — has a constitutive pedagogical component. Therein, I agree with Biesta's criticism of constructivist pedagogies' understanding of teaching as "facilitation." Teaching understood as part of a process of "transcendence," Biesta maintains, has to "bring something radically new to the student."¹²⁰ Collaboration, dialogue, and student agency are indispensable for this process to be fruitful — but there is also the teacher's responsibility of showing something to the student that they themselves have not "seen" (as in "discovered"). This "thing" to be shown is within the responsibility of the teacher. Vygotsky emphasizes: "The child does not create the complex that corresponds with the meaning of a word but finds it ready made."¹²¹ Tools, to use the words of Kozulin, "are always appropriated in terms of the goals of the given community." Kozulin writes further, "if there is no intentionality of the teacher-mediator, psychological tools will not be appropriated by the students or will be perceived as another content item, rather than a tool."¹²²

This paper, rather than making a case for pedagogical authority, seeks to advocate for the recognition of the degrees of expertise, experience, and responsibility inherent to the practice of teaching, and the complexity of the task of the teacher. In times where the need for a teacher *at all* appears to be up for discussion,¹²³ I want to make a case for the irreplaceability of the teacher in pedagogical interaction — irreplaceable by a machine, a computer, or a peer. What is unique to the teacher is pedagogical expertise, cultural familiarity, and pedagogical responsibility.

Teaching, in a Vygotskian perspective, I conclude, is not only qualitatively different from other social relations when it comes to "the artificial development of the child," but it is also highly challenging as a practice. The connectivity of teaching to *Development*, rather than *learning*, which we derive from an evolutionary reading of Vygotsky, fundamentally puts up for question a knowledge-centered conception of teaching and moves to the forefront the need for pedagogical expertise and responsibility in stepping into developmental possibilities.¹²⁴ As Kozulin points out, from Vygotsky, we derive an important differentiation between learning understood as "content learning," and Development understood as the integration and "appropriation of tools."¹²⁵ In Vygotsky, the learning processes sparked through cultural initiation in teaching only lead to Development if knowledge, cultural habits, and sociocultural artifacts are

120. Biesta, "Receiving the Gift of Teaching," 449.

121. Vygotsky, *Thinking and Speech*, 145.

122. Kozulin, "Psychological Tools and Mediated Learning," 29, 26.

123. On that point, see the critical commentary on Hattie's concepts of learning and teaching by Thomas Aastrup Rømer, "A Critique of John Hattie's Theory of Visible Learning," *Educational Philosophy and Theory* 51, no. 6 (2019): 587–598.

124. Chaiklin, "The Zone of Proximal Development in Vygotsky's Analysis of Learning and Instruction," 43.

125. Kozulin, "Psychological Tools and Mediated Learning," 25.

transmitted in their capacity as tools. This puts a focus on the pedagogical act of *Zeigen*, which goes far beyond the transmission of current knowledge or the provision of a predefined curriculum of cultural artifacts. The ZPD is not an artificially created learning process, but the purposeful and *pedagogical* stepping into a contingent zone of revolutionary possibility.